

U. S. Government

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CO-497
23 May 1963

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and requests that this transfer be accomplished at no cost to the Contractor in order to allow close out of the subject task order. It is requested that approval to transfer these items of special tooling be forwarded to the Contractor by separate return letter.

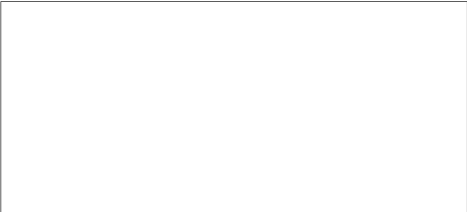
5. Enclosed is an executed copy of Contractor's Release and Assignment in the amount [] the amount agreed upon by your auditors and [] during final review of our books of account in March 1963. It is noted that this amount differs from the figure [] which was included on the Contractor's Release and Assignment forwarded to [] under cover of the reference letter. [] has made this change in the release amount to coincide with the figures agreed to by your auditors.

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6. Inasmuch as the submission of this data is the final act required by the Contractor in completion of close out of the subject task order, it is requested that your office initiate appropriate action to release the withhold of funds and completely reimburse the Contractor in accordance with the terms of the subject contract. The Contractor is particularly interested in completing these final requirements so that our records and files can be closed.

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Assistant to the President

JNM:LAK:mtd

Enclosure: As Stated Above

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2013-01

MULTIPLE IMAGE CORRELATOR EVALUATION

Progress Report - 2013-01

February / March 1963

Task Order No. 5

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2013-01

1.0 PERFORMANCE AND SCHEDULE

The evaluation program is proceeding satisfactorily and will be completed on schedule. Some internal rescheduling of tasks has been required due to lack of customer furnished material. This has not been a serious scheaule problem to date but if these inputs are not received during the next reporting period maintaining the planned schedule will be very difficult.

2.0 AREAS OF WORK

2.1 Mark I Modifications

2.1.1 Variable Aperture

Theoretical analysis and experience from other programs both indicate that better signal to noise ratios are achievable if a variable aperture slit is used. This can be accomplished by a high frequency (1-5 megacycles) modulation of the CRT in the direction perpendicular to the scan motion. This effectively creates a slit scanner in which the size parallel to the scan is given by the CRT spot size but the slit length is controllable, depending upon the imagery characteristics. The desirability of this feature combined with the difficulty of replacing the tube selected for Mark I two years ago led to replacement of the old CRT with a 5 CEP 16 equipped with micro deflection plates for the high frequency beam deflection. The tube chosen is one being used in an production program and thus its characteristics are well known.

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2.1.2 Automated Image Flicker for Visual Alignment

Operational experience has demonstrated that when aligning any two images visually, the best technique is to flicker one of them. This has previously been accomplished by manually switching the projection lamp off and on. A circuit to accomplish this automatically has been installed in the quipment.

2.2 Recommended Modifications

A major task of the Evaluation Program was to devise a better means of presenting visual information to the operator during alignment. Oscilloscope displays, particularly rack-mounted ones which could integral with the MIC, were to be analyzed. Several systems have been analyzed and two are recommended for implementation into the present equipment.

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These are:

- a) An economical and simple display in which the video signals from one image is algebraically summed with the inverted signal from the other image. The operator adjusts the stages for a null output.
- b) A dual beam oscilloscope in which both images are presented as video outputs and the operator is thus provided with a visual display of the correlation of the two images while alignment is in progress.

After an appropriate oscilloscope has been selected, the contractor will forward a request for funds to purchase and install the oscilloscope in the Mark I equipment.

2.3 Correlation Tests

While electrical modifications were being made it was possible to conduct several series of correlations on photography selected to test various limitations and, therefore, arrive at definitive guidelines for the Mark II preliminary design in addition to providing data concerning the limitations on taking devices which will provide inputs to the Mark I equipment.

These tests were conducted on photography taken by personnel. The basic areas were deliberate variations of scale and aspect angle. The results were in accord with the Mark I design characteristics, viz. in both cases the area over which alignment and consequently correlation was possible was severely limited.

These tests serve to point up the need for scale variation accommodation in the Mark II design in addition to the desirability of a slight degree of rectification.

As more film is supplied by the customer, continuing tests of this nature will allow specifications to be put on the tolerances allowed for input imagery to the Mark I equipment if it is to be used at maximum effectiveness.

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A series of tests were also made with two sets of eight photographs which were shot on spectrozonal film. Since each photograph had slightly different information the choice of "bench marks" or primary alignment region shifted with each photograph pair. In addition, the photographs were slightly out of focus and these two things combined to detract from the final correlations. Results were promising, however, and further evaluations of this type of photography should be made.

2.4 Conclusions about Mark II Design

Several design features for Mark II have been derived from tests to date. Some of these are mentioned above, e.g. oscilloscope displays, scale compensation by providing for some individual zoom in each stage and perhaps a slight rectification capability if feasible.

Another is the desirability of having all stages motor driven so that a single set of controls can be provided to align the images.

As test data accumulates other valuable inputs will be given to the Mark II program; particularly in the areas of increasing operability and calibration.

3.0 WORK PLANNED FOR THE NEXT REPORTING PERIOD

A. Visual Tests

1. Further tests on aspect angle to establish maximum range of distortions of input photography for which the Mark I will produce significant correlations.
2. Further magnification tests to establish maximum range of scale differences among samples which can be tolerated and techniques for obtaining best results.
3. Exposure variation tests.
4. Process variation tests.
5. Film grain variation tests.
6. Light variation tests (i.e. target illumination).

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B. Electrical Tests

1. Further spot size measurement tests with P-16 phosphor CRT.
2. Raster Distortion tests.
3. Evaluation of electronic image displays.
4. Information versus spot size variation tests.

4.0 SUMMARY

- 4.1 All modifications planned for the Mark I system with exception of the addition of a display oscilloscope have been made and checked out.
- 4.2 The Evaluation Program has progressed sufficiently in the critical areas that a firm recommendation for initiating development of the Mark II system can be made at this time.

30 April 1962

3. On 11 April, the undersigned delivered to [] the photographic negative materials for the preliminary tests on the Image Correlator device, recently completed by that organization. During this initial visit, only the visual and optical alignment procedures were used and these results were most encouraging. On 16 April, the undersigned, along with [] of this office, revisited [] at which time the electronic registration system was in operation. The results from this type of operation showed a remarkable refinement and improvement in registration as compared to the visual and optical method. [] made another visit to [] on 17 April and will report in detail on this contract item. [] is sending a proposal for a test and evaluation program covering a period of six months on this new device.

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